



Installation Guide



**POWER
MEASUREMENT**

drive energy performance™

Danger



This symbol indicates the presence of dangerous voltage within and outside the product enclosure that may constitute a risk of electric shock, serious injury or death to persons if proper precautions are not followed.

Caution



This symbol alerts the user to the presence of hazards that may cause minor or moderate injury to persons, damage to property or damage to the device itself, if proper precautions are not followed.

Note



This symbol directs the user's attention to important installation, operating and maintenance instructions.

Installation Considerations

Installation and maintenance of the ION 6300 meter should only be performed by qualified, competent personnel that have appropriate training and experience with high voltage and current devices. The meter must be installed in accordance with all local and National Electrical Codes.

DANGER

Failure to observe the following instructions may result in severe injury or death.

- ◆ During normal operation of the ION 6300 meter, hazardous voltages are present inside its case and on associated wiring. Follow standard safety precautions while performing any installation or service work (e.g. opening fuses/breakers).
- ◆ There are no user-serviceable parts inside the ION 6300.

CAUTION

Observe the following instructions, or permanent damage to the meter may occur.

- ◆ The ION 6300 meter is powered from the line it is monitoring, and has different hardware options that affect voltage input ratings. The ION 6300 meter's serial number label lists all equipped options. Applying voltage levels incompatible with the input ratings will permanently damage the meter.
- ◆ The ION 6300 meter's ground wire must be properly connected to earth ground for the noise and surge protection circuitry to function correctly. Failure to do so will void the warranty.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ◆ Reorient or relocate the receiving antenna
- ◆ Increase the separation between the equipment and receiver. Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Modifications: Modifications to this device which are not approved by Power Measurement may void the authority granted to the user by the FCC to operate this equipment.

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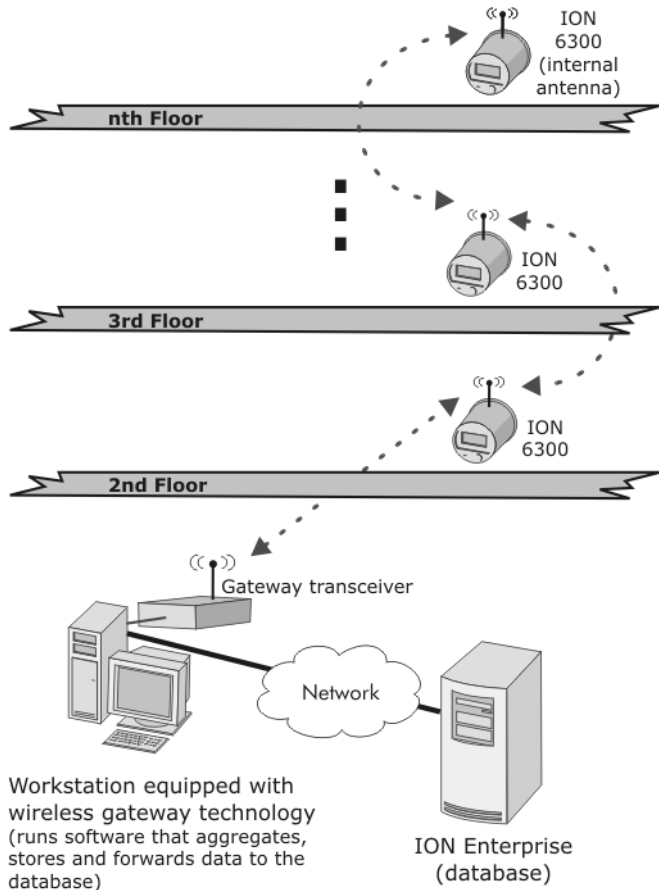
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Covered by one or more of the following patents:

U.S. Patent No's 6792364, 6792337, 6751562, 6745138, 6737855, 6694270, 6671654, 6671635, 6687627, 6615147, 6611922, 6611773, 6563697, 6493644, 6397155, 6186842, 6185508, 6000034, 5995911, 5828576, 5736847, 5650936, D459259, D458863, D443541, D439535, D435471, D432934, D429655, D429533, D427533.

ION 6300 Socket Based Wireless Energy Meter

The ION[®] 6300 is a metering and data transmitting component of your energy management system that features a compact design, wireless communications, and socket mounting for quick and easy installation.



Each ION 6300 meter measures power and calculates energy use at its installed location (load point) inside your building. The data is periodically sent and transmitted through the other ION 6300 meters in the building, to the wireless gateway. The gateway collects and stores the data, then forwards the data to the ION Enterprise[®] server for processing and storage.

Limitations on Wireless Communications

| | |
|----------------------------|--|
| Operating frequency | License-free 900 MHz ISM radio band |
| Operating range | Typical 30 meter (100 ft) range to other routers (indoor, line of sight) |

The range of wireless communication is reduced when transmitting through building materials such as concrete or steel. Test results in modern skyscrapers displayed the ability to communicate reliably from one to three floors distance between two ION 6300 meters. Ranges up to 50 feet are typical when transmitting through walls constructed with wood or drywall. Communication ranges depend on the environment where the device is installed.

Wireless Repeater

The use of a wireless repeater may be necessary in cases where the meters are far from the gateway or other meters. Contact Power Measurement™ for ordering information.

Before You Begin

1. Check to ensure you received the correct meter options, compatible with the electrical system that your meter will be monitoring. Refer to the “Available Options” section for details.
2. Read this manual in its entirety. Follow the warnings presented in the “Installation Considerations” section.
3. Review the building plans. Check that the wiring/installation plans for the ION 6300 meters conform to the requirements of the building’s electrical system.
4. Coordinate the installation of the ION 6300 meters with the installation of the gateway. The gateway should be installed first so that the meter can provide communications diagnostics immediately after installation.



NOTE

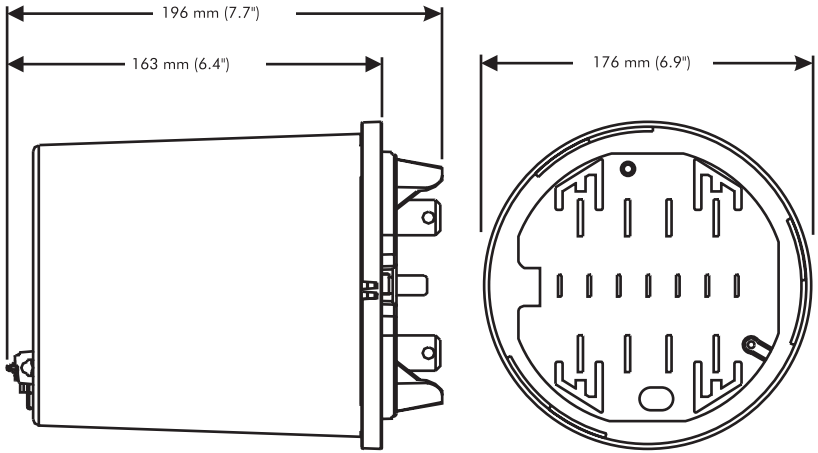
Consult the Location ID on the ION 6300 meter label to see where the meter should be installed (e.g. floor number, panel number).

Getting More Information

Additional material related to the ION 6300 and other Power Measurement products are available online at www.pwrn.com. This manual is also available in PDF format and can be downloaded from our website.

Meter Dimensions

The ION 6300 has the following dimensions:



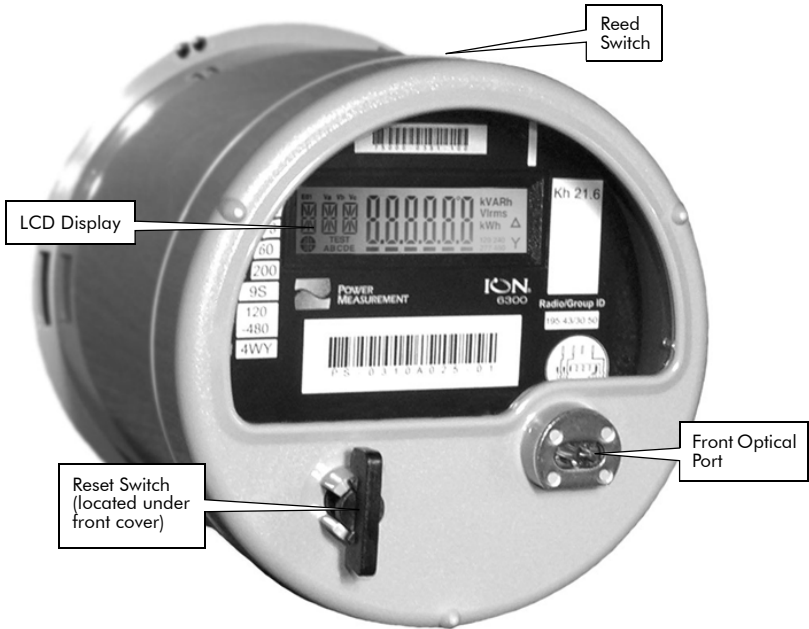
Voltage Inputs

| | |
|---|---|
| Nameplate Voltage | $V_n = 120 - 480 \text{ VAC}$ |
| Temporary Overvoltage Withstand (0.5 seconds) | 150% of V_n |
| Continuous Overvoltage Withstand (5 hours) | 130% of V_n |
| Surge Withstand | Oscillatory = 3 kV (1 mHz; 100 Hz, 10 seconds) Fast Transient = 5 kV (50 pulses/sec, 20 seconds) |

Current Inputs

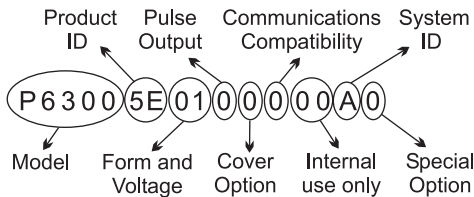
| Meter Class | Starting Load | Continuous Max. (5 hours) | Temporary Max. (6 line cycles) |
|-------------|---------------|---------------------------|--------------------------------|
| Class 20 | 0.005 Amps | 30 Amps | 400 Amps |
| Class 120 | 0.050 Amps | - | - |
| Class 200 | 0.050 Amps | 250 Amps | 7000 Amps |
| Class 320 | 0.050 Amps | 320 Amps | 7000 Amps |
| Class 480 | 0.120 Amps | 600 Amps | 7000 Amps |

Meter Overview



| | |
|---------------------|---|
| RESET SWITCH | Initiates a demand reset, resetting the demand values in the meter, storing the current demand values and starting a new demand interval. Only accessible on unsealed meters. |
| REED SWITCH | The reed switch is found at the 12 o'clock position (on top of the meter), and is used for entering: <ul style="list-style-type: none"> ◆ the alternate display sequence, (swipe with a magnet) ◆ the diagnostic display sequence (hold the magnet at this position for three seconds) |

Available Options



Installation

The ION 6300 is designed to plug into a socket mount.

Environmental Conditions

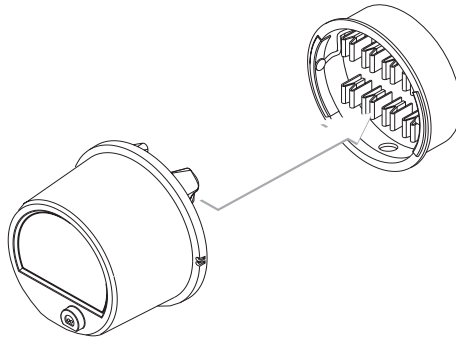
| | |
|-----------------------|--------------------------------|
| Mounting location | Indoor |
| Operating temperature | -40°F to 185°F (-40°C to 85°C) |
| Relative humidity | up to 95%, non-condensing |

Step 1: Mounting the Meter

DANGER

Mounting and installation of the ION 6300 should be performed only by licensed electricians, and must conform to all applicable local electrical codes.

1. Disconnect all power to the socket.
2. Align the meter and insert into the socket. Make sure the blades are pushed in firmly.



3. Seal the Demand Reset switch (if required).

Step 2: Power Up the Meter

No additional wiring is needed to power the meter; the ION 6300 is powered from the electrical system it is monitoring (i.e. voltage inputs V_a and V_c).

1. Close the PT fuses (or direct voltage input fuses).
2. Open the CT shorting blocks.
3. Apply power to the meter.

The meter automatically detects the service type and voltage, displaying the information on the LCD and properly configuring a complete diagnostic check of the installation. This feature checks if the service matches the meter form type (i.e., a 8/9S meter form will not function as a 6S meter form).

In cases where all three potentials are not initially present when the meter first powers up (e.g. installing a meter in a 480V site), the meter will not be able to identify the service at first and will then rescan the voltage and phase information every minute until correctly identifying the service type.

NOTE

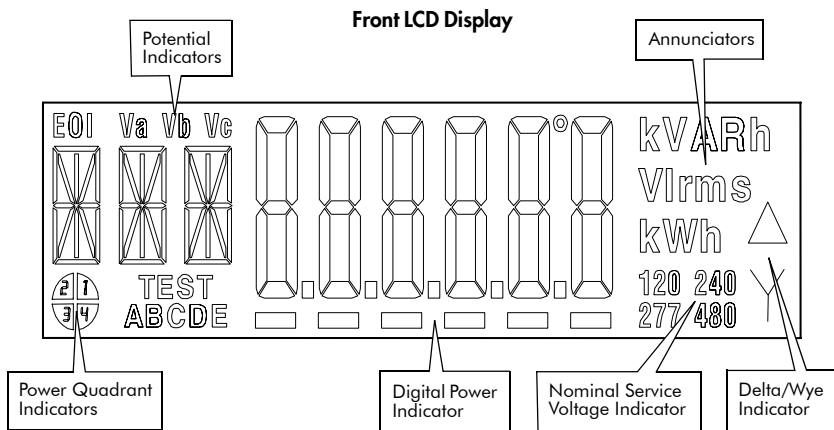
An ION 6300 can be re-installed as a different type without needing to be re-programmed.

Step 3: Verify Meter Operation and Communications

Use the front panel display to confirm the meter is configured and operating properly.

Meter Display

The front panel display screens on the ION 6300 provide both energy values and diagnostics information.



Potential Indicators (V_a , V_b , V_c) -- appear only if the service is polyphase and only then if potential is applied to the respective phase.

Annunciators ($kVARh$, V_{rms} , kWh , etc.) -- are pre-programmed for display. They can be enabled or disabled; this feature does not affect the other indicators/identifiers on the LCD.

Nominal Service Voltage Indicator (120, 240, 277, 480) -- signals which service voltage is being applied to the meter.

Power Quadrant Indicator -- flashes the quadrant in which power is presently applied.

Delta/Wye Indicator -- displays the service type of the meter. The triangle indicates Delta mode, while the "Y" indicates Wye.

Digital Power Indicator -- scrolls across the bottom of the display (left to right) to indicate positive or (right to left) to indicate negative energy flow.

Accessing the Display Sequences

There are three display sequences: Normal, Alternate, and Diagnostic.

Normal Display Sequence

The meter automatically scrolls through the normal display sequence under normal operating conditions.

Alternate Display Sequence

The alternate display sequence includes several more screens than the normal sequence. To activate the alternate display, swipe a magnet over the meter in the 12 o' clock position; this activates the reed switch. The word "Alt" appears on the display before the alternate display sequence starts.

The meter automatically exits back to the normal display sequence after one pass through the alternate displays.

Diagnostic Display Sequence

This sequence is designed to facilitate troubleshooting problems in the meter installation. All normal meter functioning continues while in the diagnostic display sequence. To activate the diagnostic display sequence, activate the reed switch for three seconds. The display will go blank briefly, which indicates the beginning of the sequence.

To exit, remove the magnet; the meter returns to the normal display sequence.

Error Screens

An error screen may appear during a display sequence. Contact Technical Support for more information.

Meter Communications

Wireless Radio

The meter communicates to the wireless network and gateway via an internal antenna. Repeaters are used where a signal boost is required (for example, over long distances). Your meter's wireless ID is set at the Factory.

Front Optical Port

An ANSI Type II optical port is provided for Factory use. The optical port and calibration output share the same LED. Whenever the meter is not communicating, the LED will pulse at a rate proportional to the wathours flowing through the meter.

Communications Diagnostics

The Radio Link Status display screen indicates if the meter is communicating with the network. A value of 0 (zero) means communications cannot be established, while a value of 1 (one) means a communications link is confirmed.

Default Display Screens

| Sequence | Position | Indicator | Description |
|----------------------------------|----------|-----------------|---------------------------------|
| Normal Displays | 1 | 000 | All segments |
| | 2 | LNK | Radio link status |
| | 3 | 001 | Total kWh |
| | 4 | 002 | Total Wh |
| Alternate Displays | 1 | 000 | All segments |
| | 2 | 000 | Radio link status |
| | 3 | 001 | Total kWh |
| | 4 | 002 | Total Wh |
| | 5 | 003 | Negative kWh |
| | 6 | 004 | Subinterval length (in minutes) |
| | 7 | 005 | kh |
| | 8 | 006 | Instantaneous neutral current |
| Diagnostic Displays ¹ | 1 | PHA | Phase A voltage angle |
| | 2 | PHA | Phase A instantaneous Vrms |
| | 3 | PHA | Phase A current angle |
| | 4 | PHA | Phase A instantaneous Irms |
| | 5 | PHB | Phase B voltage angle |
| | 6 | PHB | Phase B instantaneous Vrms |
| | 7 | PHB | Phase B current angle |
| | 8 | PHB | Phase B instantaneous Irms |
| | 9 | PHC | Phase C voltage angle |
| | 10 | PHC | Phase C instantaneous Vrms |
| | 11 | PHC | Phase C current angle |
| | 12 | PHC | Phase C instantaneous Irms |
| | 13 | D1 | Diagnostic counter 1 |
| | 14 | D2 | Diagnostic counter 2 |
| | 15 | D3 | Diagnostic counter 3 |
| | 16 | D4 | Diagnostic counter 4 |
| | 17 | D6 ² | Diagnostic counter 6 |
| | 18 | D7 | Diagnostic counter 7 |

¹ If the phase is not present, the corresponding diagnostic screens will not appear in the sequence.

² Diagnostic counter 5 does not exist (reserved for future use).

Diagnostic Screens

D1 (Polarity and Cross-phase)

The D1 diagnostic checks for proper phase relationships of voltage, incorrect polarity of voltage, internal meter measurement malfunction, and faulty site wiring. The envelope of the voltage phasors is fixed at ± 10 . If the voltage phasor values measure more than ± 10 from their nominal position, an error will be detected. This check is not performed when phase A voltage is missing.

D2 (Phase Voltage Deviation Check)

The Phase Voltage Deviation Check verifies loss of phase voltage, incorrect phase voltage, shorted voltage transformer windings, or incorrect voltage transformer ratio by detecting differences between phase voltage magnitudes. This check uses the nominal voltage per phase as a reference. The tolerance range of the voltage deviation (%) is pre-programmed.

D3 (Inactive Phase Current Check)

The Inactive Phase Current Check verifies that the service is maintaining an acceptable current level and is expected to detect current diversion and an open or shorted CT circuit. The low current value is pre-programmed into the register and will have a limit starting at the creep level of the meter and up to 200A in increments of 1mA. Each phase can have a separate threshold. The error flag will trip if one or more currents fall below its threshold and at least one current remains above this value for more than 15 seconds. The error flag will not trip if all phase currents fall below their thresholds.

D4 (Phase Angle Displacement Check)

The Phase Angle Displacement Check diagnostic verifies that the elements are sensing and receiving the correct current for each phase of the service and indicates poor load power factor system conditions and reversed CT's. The phase displacement angle () is pre-programmed. Angles for leading and lagging loads are separately programmable. The current phasors must be within this programmable phase with respect to their voltage phasor to pass this diagnostic check. This is calculated with respect to its respective voltage phasor, not necessarily phase A's voltage phasor. The check is not performed if Diagnostic #3 did not pass or if phase A voltage is missing.

D6 (Current Magnitude Imbalance Check)

This diagnostic compares the current of each phase with the other phases in the installation. If the ratio between any phase current and the average of all phase currents exceeds the user programmable percentage, then this diagnostic flag is tripped. The check is not performed if Diagnostic #3 did not pass, if the average current is below 0.5% of class, or if phase A voltage is missing.

D7 (Energy Polarity Check)

The D7 diagnostic checks for reverse energy flow of one or more phases. If the energy polarity (watts) for any phase is negative, this flag will be tripped. This check is not performed if phase A voltage is missing.

For further assistance
please contact us at:



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